

On-Farm Nitrogen Network Demonstration, Crop Year 2002

Tracy Blackmer, Tel: 515-251-8640, tblackmer@iasoybeans.com

Iowa Soybean Association, 4554 NW 114th St., Urbandale, IA 50322

Background, Partners and Description

Iowa agriculture is increasingly identified as a primary source of pollution, particularly losses of nitrogen (N) from row crop fields and associated impacts upon local and regional water quality. The form, timing and application rate of N fertilizers are management aspects that farmers have the ability to control. Effective management of these aspects may minimize negative environmental impacts and increase management efficiency, providing farmers an economic return. Recognizing the need to improve environmental performance, while improving the profitability of farmers, the Iowa Soybean Association, with support from the Iowa Department of Agriculture and Land Stewardship, crop consultants, farmer coops, community colleges, Iowa State University researchers, John Deere, United Agri-Products, Geovantage and the Iowa Soybean Promotion Board, are empowering a network of over 100 Iowa farmers to evaluate, validate and demonstrate performance of on-farm nitrogen management.

The purpose of the On-Farm N Network is to enable growers to improve nitrogen management by evaluating their current practice to an alternative or modified management practice. Historic efforts to improve N management have often focused on “telling” and “showing” farmers prescriptions of better management practices (BMPs) and then convincing or incentivizing them to adopt the “BMPs”. The vision of the On-Farm N Network is to enable farmers to “do” evaluation of alternative practices themselves on their own farms, across entire fields (not small plots), where performance data and information they receive is real world and directly applicable to their situations. Results indicate the potential for growers to improve N management is great. Many of the common BMPs advocated by universities and agencies are generally broadened for simplicity sake and wide range of adoption. Growers doing their own evaluations can further refine their management so the room for local improvement is real. By sharing data from multiple growers in an area, the impact of these demonstrations becomes much more valuable and therefore more effective. Because of the varying effect of weather, the need to evaluate over several years becomes more important. After completing a second year of evaluation, many growers developed confidence to change their management practice.

All of the growers involved in the On-Farm N Network have combines equipped with a Global Positioning System (GPS) and yield monitors. The growers were given guidance and a design protocol that is both easy to implement and will give meaningful information. The basic design is for a grower to put out replicated strips comparing two N treatments over the length of a field for at least 20 acres. One treatment is the grower’s normal practice, perhaps the normalized BMP, and the other being an alternative practice. The majority of the treatments for Crop Year 2001 and 2002 were the farmers’ normal N rate compared to the farmer’s normal N rate less 50 lbs N/acre. By using the same type of fertilizer, the same equipment and timing, and conducting evaluation on grower’s farms as opposed to research stations, the data is more meaningful to many growers.

Participants and Demonstration Locations

County	#
Adams	1
Blackhawk	7
Boone	13
Bremer	2
Buchanan	8
Butler	1
Carroll	1
Cedar	3
Cerro Gordo	7
Cherokee	1
Chickasaw	6
Clay	3
Clinton	1
Dallas	2
Deleware	2
Dickinson	3
Fayette	1
Floyd	1
Franklin	1
Fremont	3
Greene	8
Hamilton	1
Hardin	3
Howard	4

County	#
Humboldt	1
Ida	3
Jasper	2
Jefferson	2
Johnson	1
Jones	1
Kossuth	2
Linn	3
Lucas	1
Marshall	1
Mills	1
O'Brien	1
Osceola	7
Palo Alto	2
Polk	1
Sioux	4
Story	5
Tama	3
Warren	1
Washington	5
Webster	1
Winneshiek	1
Wright	2

A total of 134 sites were established. While most growers established a single trial, several growers had more than one trial. By December 31, 2002, 99 trials were successfully completed from Crop Year 2001 and 67 of the 163 so far for Crop Year 2002.

Tools Involved

GPS and Yield Monitors –

Roughly half of all new combines are equipped with yield monitors. Yield monitors, when properly calibrated and operated, give growers the opportunity to measure the yield collected over portions of a field. Adding a global positioning system receiver to allow the yield data to be linked with a geospatial position in the field increases the information power of the yield monitor. In this project growers had both a GPS and yield monitor to collect data over the demonstration area. This permitted them to not only measure the yield differences over the entire 20 acres, but also measure differences in a smaller portion of a field with unique characteristics such as a soil type.

Aerial Photography –

Color aerial photographs were collected for the majority of sites. This involved taking color photographs with a 35 mm camera from an airplane. This type of photography has been proven capable of detecting N deficiencies in corn. These pictures can be taken before harvest to determine which portions of a field may be N stressed. This is a low-cost tool available to growers that also adds credibility to the yield differences measured by the combine. Actual examples can be seen in the case study section of the Crop Year 2001 report.



Aerial Imagery –

For the 2002 season, ISA obtained digital imagery for many of the test sites. This imagery was all collected by a contracted service provider and was automatically georeferenced. The georeferencing permitted the easy and accurate incorporation into a Geographic Information System (GIS). The spatial registering of the imagery along with the yield information allows growers to determine where to take point samples for stalk tests or other assessments.

Elevation Mapping –

Differences in topography account for a lot of the variation in soil types. With accurate elevation data, differences in landscape position can be quantified. Elevation data can be used to calculate other variables such as slope. All of these variables can be used to determine factors that affect the optimal amount of N required based upon different landscape positions.



Soil Conductivity –

This is a relatively new variable that some crop consultants are starting to use to measure differences in soil properties. We are using the Geonics EM-38 that has been useful in detecting differences, such as texture, in soils. The actual unit is the orange piece of equipment on a wooden sled behind the ATV.

Preliminary Results

At the time of preparing this report, less than half of the trials from the 2002 crop season were finalized. The majority of these reports show growers are applying less N than would be recommended based upon yield goal based recommendations. Despite operating within the current BMPs available, the growers identified an opportunity for additional improvement by adopting a self-evaluation process on their farm.

The following points have emerged from the grower meetings:

1. The second year of evaluation adds tremendous credibility to past findings. In one meeting all the growers had changed their management based upon the results of the trials from their group.
2. A number of growers question why yield goal based recommendations are still considered the foundation for determining N rates.
3. As growers learned more about the complexities of N management and the potential profit associated with it, there was a desire to set up more trials to further fine-tune certain management aspects.
4. For sites that did show differences in yield due to N, it was usually not the highest yielding areas that needed higher rates of N. Growers could often identify patterns of yield response within a field to organic matter. Usually the higher yielding areas had the most organic matter, the highest yield, and the lowest N fertilizer requirement.

Grower meetings were held during February 2003 and many will continue through March. A statewide meeting is scheduled in Ames on Feb 7, 2003. Summaries of the findings and the group discussions will be available on the World Wide Web page <http://www.iasoybeans.com>. In addition, more in depth examples will be made available as the data processing is completed.

Communications and Outreach

In addition to the On-Farm N Network participants, significant outreach activities were conducted to inform other growers and the broader public about the opportunity to improve their N management. And, as results are further quantified, additional outreach efforts will be performed.

During the summer of 2002, seven different N management field days were held around Iowa. Five of these field days were held at community colleges and two at grower locations. These field days provided an opportunity for project partners to discuss the approach that was being taken at the demonstration site and provided a venue to discuss associated environmental issues.

Three radio interviews were conducted with project partners as part of the Iowa Soybean Radio network. These taped interviews were aired on 11 radio stations across Iowa were given on several occasions and will continue with the progression of the data analysis.

Magazine/newspaper articles referencing the project have appeared over the last two years in the Iowa Soybean Review, Farm Bureau Spokesman, Successful Farming, Progressive Farmer, Wallaces Farmer, Iowa Farmer Today and Farm News.

Eleven Different Crop Fairs were held featuring presentations about the On-Farm N Network. These Crop Fairs were hosted and sponsored by the Iowa Soybean Promotion Board, Iowa Corn Promotion Board and local area cooperatives or other agribusiness.

Presentations to growers were included in 5 Information Exchange Meetings with the Iowa Soybean Association.

In addition, over 25 requested presentations were made about his project and its results to groups including grower organizations, environmental groups, seed companies, crop consultants and others.